

CLAIMS

The embodiments of the invention in which an exclusive property or privilege is claimed are defined as follows:

1           1.    A welding/plasma power source comprising:  
2                an input stage configured to receive an ac input  
3                signal having a period of T seconds and to rectify the  
4                ac input signal to provide a rectified intermediate  
5                signal having a peak voltage and further wherein the  
6                input stage provides a dc voltage signal having a  
7                voltage of V volts across a dc bus, wherein V is  
8                greater than the peak voltage of the rectified  
9                intermediate signal;  
10              an output stage disposed to receive the dc voltage  
11              signal and configured to provide an available output  
12              power signal having a power of P watts; and  
13              a bus capacitor connected across the dc bus  
14              wherein the bus capacitor has a capacitance of at least  
15               $(3PT)/(V^2)$  farads.

1           2.    The welding/plasma power source of claim 1  
2                wherein the capacitance is at least  $(4PT)/(V^2)$ .

1           3.    The welding/plasma power source of claim 1  
2                wherein the capacitance is at least  $(5PT)/(V^2)$ .

1           4.    The welding/plasma power source of claim 1  
2                wherein the input stage includes an input rectifier  
3                configured to receive the ac input signal.

1           5.    The welding/plasma power source of claim 4  
2    wherein the input stage further includes a converter  
3    configured to provide the dc voltage signal.

1           6.    The welding/plasma power source of claim 5  
2    wherein the converter is a boost converter.

1           7.    The welding/plasma power source of claim 5  
2    wherein the converter is a buck converter.

1           8.    The welding/plasma power source of claim 1  
2    wherein the input stage includes a converter configured to  
3    provide the dc voltage signal.

1           9.    The welding/plasma power source of claim 1  
2    wherein the output stage includes an inverter disposed to  
3    receive the dc voltage signal.

1           10.   The welding/plasma power source of claim 9  
2    wherein the inverter is a pulse width modulating inverter.

1           11.   The welding/plasma power source of claim 9  
2    wherein the output stage further includes an output  
3    transformer configured to provide the available output power  
4    signal.

1           12.   The welding/plasma power source of claim 9  
2    wherein the output stage further includes an output  
3    rectifier configured to provide the available output power  
4    signal.

1           13. The welding/plasma power source of claim 1  
2 wherein the output stage includes an output rectifier  
3 configured to provide the available output power signal.

1           14. A welding/plasma power source comprising:  
2 an input stage configured to receive an ac input  
3 signal having a period of T seconds and to rectify the  
4 ac input signal to provide a rectified intermediate  
5 signal having a peak voltage and further wherein the  
6 input stage provides a dc voltage signal having a  
7 voltage of V volts across a dc bus, wherein V is  
8 greater than the peak voltage of the rectified  
9 intermediate signal;

10 an output stage disposed to receive the dc voltage  
11 signal and configured to provide an available output  
12 power signal having a power of P watts; and

13 an energy storage device connected to provide  
14 stored energy to the dc bus, wherein the energy storage  
15 device can store energy of at least (1.5)(PT) joules.

1           15. The welding/plasma power source of claim 14  
2 wherein the energy storage device can store energy of at  
3 least (2)(PT) joules.

1           16. The welding/plasma power source of claim 14  
2 wherein the energy storage device can store energy of at  
3 least (2.5)(PT) joules.

1           17. A welding/plasma power source comprising:  
2 an input stage configured to receive an ac input  
3 signal and to rectify the ac input signal to provide a  
4 rectified intermediate signal having a peak voltage and  
5 further wherein the input stage provides a dc voltage

6 signal having a voltage of V volts across a dc bus,  
7 wherein V is greater than the peak voltage of the  
8 rectified intermediate signal;

9 an output stage disposed to receive the dc voltage  
10 signal and configured to provide an available output  
11 power signal; and

12 a bus capacitor connected across the dc bus  
13 wherein the bus capacitor has a capacitance of at least  
14 438 microfarads.

1 18. The welding/plasma power source of claim 17  
2 wherein the capacitance is at least 500 microfarads.

1 19. The welding/plasma power source of claim 17  
2 wherein the capacitance is at least 583 microfarads.

1 20. The welding/plasma power source of claim 17  
2 wherein the capacitance is at least 729 microfarads.

1 21. A welding/plasma power source comprising:  
2 an input stage configured to receive an ac input  
3 signal from a utility source and a generator source and  
4 further wherein the input stage provides a dc bus  
5 signal;

6 an output stage disposed to receive the dc bus  
7 signal and configured to provide an available output  
8 power wherein the available output power has a first  
9 value when the ac input signal is from the utility  
10 source and a second value when the ac input signal is  
11 from the generator source and further wherein the  
12 second value is at least seventy-five percent of the  
13 first value.

1           22. The welding/plasma power source of claim 21  
2 wherein the second value is at least ninety percent of the  
3 first value.

1           23. The welding/plasma power source of claim 21  
2 wherein the second value is at least ninety-five percent of  
3 the first value.

1           24. A welding/plasma power source comprising:  
2           an input stage configured to receive an ac input  
3 signal and to rectify the ac input signal to provide a  
4 rectified intermediate signal having a peak voltage and  
5 further wherein the input stage provides a dc voltage  
6 signal having a voltage of V volts across a dc bus,  
7 wherein V is greater than the peak voltage of the  
8 rectified intermediate signal;  
9           an output stage disposed to receive the dc voltage  
10 signal and configured to provide an available output  
11 power signal; and  
12           an energy storage device connected to provide  
13 stored energy to the dc bus, wherein the energy storage  
14 device can store sufficient energy to maintain the  
15 available output power signal through the duration of  
16 mechanical transients.

1           25. A welding/plasma power source comprising:  
2           a generator source configured to provide an ac  
3 input signal wherein the ac input signal includes at  
4 least one mechanical transient;  
5           an input stage configured to receive the ac input  
6 signal from the generator source and to rectify the ac  
7 input signal to provide a rectified intermediate signal  
8 having a peak voltage and further wherein the input

stage provides a dc voltage signal having a voltage of V volts across a dc bus, wherein V is greater than the peak voltage of the rectified intermediate signal;

an output stage disposed to receive the dc voltage signal and configured to provide an available output power signal; and

an energy storage device connected to provide stored energy to the dc bus, wherein the energy storage device can store sufficient energy to maintain the available output power signal through the duration of the at least one mechanical transient.

26. A method of providing welding/plasma power comprising:

receiving an ac input signal having a period of T seconds;

rectifying the ac input signal to provide a rectified intermediate signal having a peak voltage;

providing a dc voltage signal having a voltage of V volts across a dc bus, wherein V is greater than the peak voltage of the rectified intermediate signal;

receiving the dc voltage signal;

providing an available output power signal having a power of P watts; and

providing a capacitance of at least  $(3PT)/(V^2)$  farads across the dc bus.

27. The method of claim 26 wherein the capacitance is at least  $(4PT)/(V^2)$ .

28. The method of claim 26 wherein the capacitance is at least  $(5PT)/(V^2)$ .

1           29. A method of providing welding/plasma power  
2 comprising:  
3           receiving an ac input signal having a period of T  
4 seconds;  
5           rectifying the ac input signal to provide a  
6 rectified intermediate signal having a peak voltage;  
7           providing a dc voltage signal having a voltage of  
8 V volts across a dc bus, wherein V is greater than the  
9 peak voltage of the rectified intermediate signal;  
10          receiving the dc voltage signal;  
11          providing an available output power signal having  
12 a power of P watts; and  
13          providing stored energy to the dc bus from an  
14 energy storage device capable of storing at least  
15 (1.5)(PT) joules of energy.

1           30. The method of claim 29 wherein the energy  
2 storage device can store energy of at least (2)(PT) joules.

1           31. The method of claim 29 wherein the energy  
2 storage device can store energy of at least (2.5)(PT)  
3 joules.

1           32. A method of providing welding/plasma power  
2 comprising:  
3           receiving an ac input signal;  
4           rectifying the ac input signal to provide a  
5 rectified intermediate signal having a peak voltage;  
6           providing a dc voltage signal having a voltage of  
7 V volts across a dc bus, wherein V is greater than the  
8 peak voltage of the rectified intermediate signal;  
9           receiving the dc voltage signal;  
10          providing an available output power signal; and

11 providing capacitance of at least 438 microfarads  
12 across the dc bus.

1 33. The method of claim 32 wherein the  
2 capacitance is at least 500 microfarads.

1 34. The method of claim 32 wherein the  
2 capacitance is at least 583 microfarads.

1 35. The method of claim 32 wherein the  
2 capacitance is at least 729 microfarads.

1 36. A method of providing welding/plasma power  
2 comprising:  
3 receiving an ac input signal from at least one of  
4 a utility source and a generator source;  
5 providing a dc bus signal;  
6 receiving the dc bus signal;  
7 providing an available output power wherein the  
8 available output power has a first value when the ac  
9 input signal is from the utility source and a second  
10 value when the ac input signal is from the generator  
11 source and further wherein the second value is at least  
12 seventy-five percent of the first value.

1 37. The method of claim 36 wherein the second  
2 value is at least ninety percent of the first value.

1 38. The method of claim 36 wherein the second  
2 value is at least ninety-five percent of the first value.

1 39. A method of providing welding/plasma power  
2 comprising:



3 receiving an ac input signal;  
4 rectifying the ac input signal to provide a  
5 rectified intermediate signal having a peak voltage;  
6 providing a dc voltage signal having a voltage of  
7 V volts across a dc bus, wherein V is greater than the  
8 peak voltage of the rectified intermediate signal;  
9 receiving the dc voltage signal;  
10 providing an available output power signal; and  
11 providing stored energy to the dc bus from an  
12 energy storage device capable of storing sufficient  
13 energy to maintain the available output power signal  
14 through the duration of mechanical transients.

1 40. A method of providing welding/plasma power  
2 comprising:  
3 providing an ac input signal from a generator  
4 source wherein the ac input signal includes at least  
5 one mechanical transient;  
6 receiving the ac input signal;  
7 rectifying the ac input signal to provide a  
8 rectified intermediate signal having a peak voltage;  
9 providing a dc voltage signal having a voltage of  
10 V volts across a dc bus, wherein V is greater than the  
11 peak voltage of the rectified intermediate signal;  
12 receiving the dc voltage signal;  
13 providing an available output power signal; and  
14 providing stored energy to the dc bus from an  
15 energy storage device capable of storing sufficient  
16 energy to maintain the available output power signal  
17 through the duration of the at least one mechanical  
18 transient.